

REMARKS

In the Office Action, the Examiner noted that claims 1-13 are pending in the application, and that claims 1-13 are rejected under one or more of the following statutory sections: 35 U.S.C. §112 and 35 U.S.C. §103. The Examiner further noted that the drawings have been objected to and require correction.

By this response, Applicants have amended the drawings and Applicants have amended claims 1, 2, 5, 10, 11, 14 and 16 to clarify a feature of their invention. In view of the above amendments and the following discussion, Applicants submit that the claims pending in the application are believed to be definite under 35 U.S.C. §112 and nonobvious under 35 U.S.C. § 103. Thus, Applicants believe that the application is in condition for allowance.

I. OBJECTION TO THE DRAWINGS

The Drawings have been objected to because the drawings numbers do not include reference signs mentioned in the specification. Particularly, reference numerals for nodes 501 through 510 in FIG. 5b are missing. Correction of the drawings has been required.

Reference numerals have now been included in FIG. 5b. The location of these numerals is consistent with the specification and the location of the numerals by node as shown in FIG. 5a. The correction to the drawing is believed to be proper and justified. Moreover, the correction to the drawing adds no new matter to this patent application.

As currently submitted, the drawings also include the correction submitted earlier in the preliminary amendment showing two dashed arrows that were inadvertently omitted. These arrows show the path that packets take as they traverse a network of interconnected nodes. The missing arrows would be easily discerned by a person skilled in the art reading the original specification, and thus do not constitute new matter.

In light of the corrections made to the drawings, Applicants submit that the grounds for objection have now been obviated. Applicants respectfully request that the objection to the drawing be withdrawn.

II. REJECTION OF CLAIMS UNDER 35 U.S.C. §112

The Examiner has rejected claims 2, 3, 7, 8, 9, 10, and 11 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The rejections of claims 2, 3, 7, 8, 9, 10, and 11 are respectfully traversed.

A. Rejection of Claims 2 and 8

Claims 2 and 8 have been rejected for their use of the phrase, "the maximum of." Each claim recites this phrase in the same context with respect determining a priority level λ^d as follows:

*the priority level λ^d [of all packets] at R_ℓ associated with d is updated as **the maximum of***

the prior value of λ^d at R_ℓ or $1 + f_\ell$.

The specification clearly states this language at least at page 8, lines 1-5 and page 13, lines 22-29. An example of the application of this technique is described on page 15, lines 7-20 and in corresponding FIG. 4. It is clear from the specification that this phrase states the use of a function known as $\max(x, y)$ in which the maximum of either variable x or variable y is selected as the output of the function. This function can alternatively be described as delivering the greater of either variable x or variable y .

In FIG. 4 and the accompanying description at page 15, f_ℓ is shown to be 1 – accordingly, $1 + f_\ell$ is 2 – and λ^d at R_ℓ associated with destination X is shown to be 4. So the priority level of the packet is increased to 4 because of the rule stated above. See *Applicants' specification at page 15, lines 10-12.*

From the cited sections of the specification and in light of the remarks above, it is believed that Applicants' definition and use of the phrase "the maximum of" in claims 2

and 8 is supported by the specification, as well as being clear and definite. Accordingly, claims 2 and 16 are believed to be clear, definite, and allowable under 35 U.S.C. §112.

B. Rejection of Claim 3

Claim 3 has been rejected for its use of the phrases, "any ultimate destination" and "the maximum number D of nodes."

Applicants recite the term "ultimate destination" at page 7, lines 8, 14, 25, and 29 and page 8, lines 10 and 14, at the very least. Each time the term is used, it is used consistently to have the same meaning. It is clear that the term means the destination for the packet. It is not an intermediate node, as queried by the Examiner. This usage is clearly supported by the common language definition of the modifier "ultimate." This modifier is generally used to signify being last in a series, process or progression.

Applicants have discussed the phrase "the maximum number D of nodes" at page 7, lines 7 and 8. The cited section of the specification recites the following:

*where **D is the maximum number of nodes** that a packet must traverse through said network (i.e., the maximum number of hops) from an originating source to an ultimate destination.*

In this context, both in the specification and in the claims, it appears to be very clear what is meant by both the phrase "the maximum number D of nodes" and the variable D as used therein. Applicants have used the variable in a number of alternative contexts, but the usage is believed to be substantially consistent. In any event, the usage with respect to claim 3 is consistent with the usage in the specification and is believed to be clear and unambiguous.

In light of the remarks above, it is believed that Applicants' definition and use of the aforementioned phrases in claim 3 is supported by the specification, as well as being clear and definite. Accordingly, claim 3 is believed to be clear, definite, and allowable under 35 U.S.C. §112.

C. Rejection of Claim 10

Claim 10 has been rejected for its use of the phrase, "D is the maximum number of hops."

Applicants have discussed the phrase “D is the maximum number of hops” at page 7, lines 7 and 8. The cited section of the specification recites the following:

*where **D** is the maximum number of nodes that a packet must traverse through said network (i.e., **the maximum number of hops**) from an originating source to an ultimate destination.*

In this context, both in the specification and in the claims, it appears to be very clear what is meant by both the phrase “D is the maximum number of hops” and the variable D as used therein. The number of hops is in fact well known in the art to be related exactly to the number of nodes traversed after the packet leaves the originating source node. The use of the term in the claim is believed to be consistent with the specification and the teachings in the art.

In light of the remarks above, it is believed that Applicants’ definition and use of the aforementioned phrases in claim 10 is supported by the specification, as well as being clear and definite. Accordingly, claim 10 is believed to be clear, definite, and allowable under 35 U.S.C. §112.

D. Rejection of Claims 7 and 11

Claims 7 and 11 have been rejected for their use of the phrase, “equal to i.”

Applicants have discussed the phrase “less than or equal to i” at page 8, lines 15-20 and at page 18, lines 4 and 5, as well as in the Abstract. The cited section of the specification recites the following in part:

*The feedback value f_ℓ sent from a receiving node R_ℓ to a sending node X_ℓ is determined by first setting in the buffer at the receiving node R_ℓ thresholds B_i that limit the maximum amount of space for **packets with priority levels λ^d less than or equal to i**. At all times, all B_i buffer threshold constraints must be satisfied.*

In this context, both in the specification and in the claims, it appears to be very clear that the variable, i, is intended to be a value associated with the priority levels λ^d . This variable has been bounded in the specification at page 11, lines 12-14. The variable i has no association with the “slots” as suggested by the Examiner. The use of the term in the claim is believed to be consistent with the specification.

In light of the remarks above, it is believed that Applicants' definition and use of the aforementioned phrase in claims 7 and 11 is supported by the specification, as well as being clear and definite. Accordingly, claim 7 and 11 are believed to be clear, definite, and allowable under 35 U.S.C. §112.

E. Rejection of Claims 9 and 11

Claims 9 and 11 have been rejected with respect to the recited steps of sending, assigning, and transmitting. The Examiner has stated that a concern about whether sending and transmitting are done before assigning or vice versa.

Applicants have described their claimed invention throughout the specification. One exemplary description of the operation of the invention was disclosed in reference to FIG. 4. In that description, the operations of sending, assigning, and transmitting are set forth in clear terms. The feedback level from a receiving node and the priority levels for packets to the same destination stored temporarily at that receiving node are separate variable. Sending the feedback level is a function of whether the receiving node has enough space for more packets awaiting transmission thereto by other transmitting nodes. Assigning the priority level is a function that takes place in the receiving node to insure that packets currently stored there have the same priority level, if those packets are destined for the same destination node. As such, the ordering of the steps in claims 9 and 11 is not inconsistent with the method described in claim 1. Both sets of claim language are consistent with each other and with the description in the specification.

In light of the remarks above, it is believed that Applicants' definition of the claimed method steps and their appearance in claims 9 and 11 are supported by the specification, as well as being clear and definite. Accordingly, claim 9 and 11 are believed to be clear, definite, and allowable under 35 U.S.C. §112.

III. REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a)

A. Rejection over Bustini in view of Fichou

The Examiner has rejected claims 1, 4, 5, 6, 7, and 12 as being unpatentable over U.S. Patent 5,313,454 to Bustini et al. (hereinafter referred to as "Bustini") in view of U.S. Patent 5,790,522 to Fichou et al. (hereinafter referred to as "Fichou"). The rejection is respectfully traversed.

Bustini describes a congestion control system for data networks. In the specification and drawings, Bustini discloses the transmission of an ICA signal from the downstream node to an upstream node separated from the downstream node by one or more intermediate nodes (see Bustini, col. 12, lines 20-23). The ICA signal is sent in anticipation of network congestion in bursty data queues of the network nodes. The ICA signal effectively initiates corrective action by controlling the rate at which each bursty node contributing to congestion accepts incoming user data (see Bustini, col. 11, lines 12-20). The ICA signal controls a rate; it does not set a threshold against which priority levels are measured. Data within each packet is not measured against the ICA signal.

Applicants have defined in claim 1 a method that involves the steps simply of assigning a priority level, transmitting upstream a feedback value, and transmitting downstream only packets meeting a condition imposed by the feedback value. The method is performed all within the confines of a portion of a network defined in the claim. This network involves the sending node X_ℓ , the receiving node R_ℓ , and the link l between the specified sending node and the specified receiving node. In claim 1, Applicants require that only those packets in the sending node whose priority level equals or exceeds the feedback value sent by the receiving node will be sent to the receiving node over the link connecting the sending and receiving nodes.

This method and the structure within which the method is defined and practiced is not taught, shown, or suggested by Bustini. With respect to the second step of claim 1, nowhere does Bustini show that a feedback value is transmitted from the receiving node back to the transmitting node over the link that connects the two nodes together. If the ICA signal is a feedback value, and Applicants do not agree that it is, it


is clearly sent to a node upstream of, and not directly connected via the link to, the receiving node. Bustini even indicates that more nodes, not fewer, may be intermediate the sending and receiving nodes. In that case, Bustini's ICA signal will be delivered to a node even farther away from the sending node. ✓

With respect to the first step of claim 1, nowhere is it taught in Bustini that each packet in the sending node is assigned a priority level from a set comprising at least two priority levels. If priority levels were in fact the classes of service pointed out by the Examiner on page 5 of the present Office Action, and Applicants do not agree that they are, Bustini fails to teach that packets of that "priority level" (Bustini's service class) are assigned that level or class by the sending node. Instead, packets are received into a node with the class of service already assigned. Furthermore, there is no teaching in Bustini that the "priority level" (Bustini's service class) is somehow compared to a feedback value (Bustini's ICA signal, as suggested by the Examiner) to determine whether to send a packet downstream. Even the Examiner has recognized that Bustini does not teach the last step of Applicants' claimed method. As a result, Bustini alone has not taught, shown or suggested Applicants' claimed invention. ✓

The teachings of Fichou have been added to Bustini in order to overcome the shortcomings of the Bustini reference with respect to Applicants' claimed invention. Fichou teaches the use of multiple queues at a node, wherein each queue maintains packets having the same priority. When congestion control is invoked through the use of a backpressure signal, high priority queues are emptied first, followed possibly by lower priority queues through the use of a spacing operation. If the high priority queues are empty, the lower priority queues are emptied by using the spacing operation from the outset until a backpressure signal or a high priority packet is received. Even when Fichou is combined with Bustini, it does not teach, show, or suggest Applicants' claimed invention.

Fichou and Bustini do not show any relationship between the signal sent to the sending node (ICA signal for Bustini; backpressure signal for Fichou) and priority levels for the transmitted packets. There is no comparison between the packet priority level and the Bustini or Fichou signals to determine which packets should be sent. Only ←

Applicants define a method in which packets are transmitted downstream from the sending node to the receiving node when their "priority level λ_p equals or exceeds the feedback value f_ℓ ," as set forth in claim 1. As a result, neither Fichou nor Bustini, separately or in combination, teach, show, or suggest Applicants' unique method.

Claim 12 presents all the same elements as claim 1 and adds a step of "periodically adjusting said feedback value." Bustini does not teach a feedback value against which the packet priority level is measured and which is periodically adjusted. While Bustini's reception of the ICA signal will cause the quiescent information rate to change, there is no indication that any of these signals or rates set a feedback value against which the packet priority level is compared to determine whether a packet can be sent to the receiving node. 

In light of the reasons presented above with respect to independent claims 1 and 12, it is submitted that Applicants' claimed invention would not have been obvious to one having ordinary skill in the art at the time Applicants' invention was made upon a reading of Fichou and Bustini, alone or in combination. As a result, claims 1 and 12 are believed to be nonobvious and allowable under 35 U.S.C. §103.

Claims 4, 5, 6, and 7 depend directly and indirectly from independent claim 1. These claims add further limitations to the method defined in claim 1. For the reasons set forth above with respect to independent claim 1, Applicants submit that dependent claims 4, 5, 6, and 7 are not obvious over the Bustini and Fichou. Accordingly, claims 4, 5, 6, and 7 are believed to be allowable under 35 U.S.C. §103.

B. Rejection over Bustini in view of Fichou and Napolitano

The Examiner has rejected claims 9 and 13 as being unpatentable over the Bustini in view of Fichou and further in view of U.S. Patent 5,471,623 issued to Napolitano (hereinafter referred to as "Napolitano"). The rejection is respectfully traversed.

The teachings of Bustini and Fichou have been described immediately above in Section III.A of the Remarks. Claim 9 defines a method having the same types of steps as claim 1. The deficiencies of the teachings of Bustini and Fichou with respect to

claim 1 have been carefully discussed above and will not be repeated herein for the sake of brevity, but they are nonetheless relied on with respect to claim 9.

In the assigning step of claim 9, Applicants call for, "assigning a priority level λ_p to packets stored in the buffer of the receiving node R_i such that all packets destined for the same destination have the same priority level." Neither Bustini, nor Fichou, nor Napolitano, separately or in combination, teach, show, or suggest Applicants' unique claim limitation.

Bustini teaches number of hops, different rates, and different types of service, none of which constitute a priority level. Nowhere does Bustini teach that, "all packets destined for the same destination have the same priority level," as claimed by Applicants. It is understood that the Examiner agrees with this shortcoming in Bustini based on the statement at the top of page 15 in the present Office Action.

Fichou does teach priority levels, but those levels are set by the type of traffic, namely, real-time (RT), non-real-time (NRT), and non-reserved (NR). None of these priority levels has anything to do with the ultimate destination of the packet. Instead, the priority has everything to do with the data content of the packet. Nowhere does Fichou teach that, "all packets destined for the same destination have the same priority level," as claimed by Applicants. It is understood that the Examiner agrees with this shortcoming in Fichou based on the statement at the top of page 15 in the present Office Action.

Napolitano teaches deadlock avoidance at col. 11, line 39 et seq. In that scheme, a packet is not allowed to traverse a link in the network unless the available buffer size in terms of the number of packets at the end of the link is greater than or equal to the distance in terms of the number of links the packet has yet to travel. In addition, Napolitano teaches the use of a recirculating path around each queue so that, when the node appears deadlocked, the packet at the head of the queue is placed at the tail end of the queue. But Napolitano does not set priorities or teach priorities based on having, "all packets destined for the same destination have the same priority level," as claimed by Applicants. Napolitano does not compare any packet feature to a

feedback level to determine which packets could be sent to a receiving node, as claimed by Applicants.

In light of the reasons presented above with respect to independent claim 9, it is submitted that Applicants' claimed invention would not have been obvious to one having ordinary skill in the art at the time Applicants' invention was made upon a reading of Fichou and Bustini and Napolitano, alone or in combination. As a result, claim 9 is believed to be nonobvious and allowable under 35 U.S.C. §103.

Since claim 13 depends directly from claim 9, it includes all the novel elements of the respective base claims as described above. In addition to all the novel elements defined in claim 9, claim 13 teaches, "assigning a priority level λ_p such that packets closer to their destination have a higher priority level." This concept is not found in Bustini or Fichou or Napolitano.

In light of the reasons given above, it is respectfully submitted that neither Bustini nor Fichou nor Napolitano, separately or in combination, teach, show, or suggest Applicants' invention defined by claim 13. Therefore, claim 13 is believed to be nonobvious and allowable under 35 U.S.C. §103.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants believe that this application is in condition for allowance. Reconsideration of this application and allowance are respectfully solicited.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Matthew J. Hodulik, Esq. at (732) 949-9742 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,



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